



## Validity and interpretation of *Murcia* Koch, *Trichoribates* Berlese and their type species (Acari: Oribatida: Ceratozetidae)

GERD WEIGMANN<sup>1</sup> & ROY A. NORTON<sup>2</sup>

<sup>1</sup> Institute of Zoology, Free University Berlin; Koenigin-Luise-Str. 1-3, 14195 Berlin, Germany. E-mail: weigmann@zedat.fu-berlin.de

<sup>2</sup> SUNY College of Environmental Science & Forestry; 1 Forestry Drive; Syracuse, New York 13210, USA. E-mail: ranorton@esf.edu

In the literature there is much confusion about the identity and taxonomic position of two common oribatid mite species in the family Ceratozetidae: *Oribates setosus* C.L. Koch, 1839, and *Murcia trimaculata* C.L. Koch, 1835. Related to these problems, there are contrary opinions about the validity of two ceratozetid genera, *Murcia* Koch, 1835 and *Trichoribates* Berlese, 1910, and the identity of their type species. Important conclusions on these issues have been proposed in the past (Jacot 1929; Pérez-Iñigo 1993) but these were not followed in an important recent catalog (Subías 2004). In the following, we summarize and comment on the history of these problems, and argue in the context of the current ICZN rules to preserve nomenclatural stability.

### A. The identity of *Oribates setosus* C.L. Koch

1) In his classic, multiyear work *Deutschlands Crustaceen, Myriapoden und Arachniden* (CMA), C.L. Koch (1839, CMA 30.19) proposed *Oribates setosus*. The description and illustration of this species was clearly based on the adult stage of a pterogasterine oribatid mite.

2) Koch (1843: 98) grouped *O. setosus* together with *O. picipes* Koch, 1839 (CMA 30.15), *O. fuscipes* Koch, 1844 (CMA 38.9; the description was not yet published in 1843), *O. mollicomus* Koch, 1839 (CMA 30.20) and *O. angulatus* Koch, 1839 (CMA 30.21) as species group “β” of *Oribates* Dugès, 1834. [note: Koch divided the genus *Oribata* Latreille, 1802 – which included all named oribatid species at that time – into eight genera, omitting the first genus *Oribata*. Michael (1884) discussed the different systematic concepts and obviously regarded *Oribates* sensu Koch as junior synonym of *Oribata* s. str.] Koch characterized this group as having a small pteromorph, a lamella with protruding cusp, a claviform sensillus and an oval notogastral shape (characters translated from Koch’s terminology into modern usage; see Weigmann (2006)).

3) Michael (1884: 243; pl. 7, figs. 3–12) described and illustrated the adult and tritonymph of what he considered *Oribates setosus*. He also assumed that his illustrated “nymph is probably the creature described by Koch under the name of *Murcia trimaculata*” (1884: 245); i.e., in his opinion the two names were probably synonyms (see B.4, below). However, Michael’s work was based on a misidentification, as discussed below, and the species he studied is referred to herein as “*Oribata setosa* sensu Michael (non-Koch).” Because his descriptions and illustrations were relatively good, we believe that Michael’s specimens belonged to a species named more than a century later: *Trichoribates myrica* Gjelstrup & Solhøy, 1994. This species has so far been reported from the type-locality in Iceland and from Germany (Weigmann 2006).

4) Michael (1888: 578) discussed an unusual variability among British populations of *Oribata setosa* sensu Michael (non-Koch), regarding the relative length of the lamellar cusp. It seems probable that these observations relate instead to two or more species. For example, the elongated lamellar cusp of the adult in his illustration (Michael 1884: pl. 7, fig. 3) looks like that of *T. myrica*, but the “variants” could relate to other species of *Trichoribates* reported from England (Luxton 1996), including *T. novus* Sellnick, 1928, *T. monticolus* (Trägårdh, 1902) and *T. trimaculatus* auct. (in the sense of modern authors since Willmann 1931; see Weigmann 2006: 388; see also section D, below).

5) Berlese (1887; AMS 43.4) published an interpretation of *Oribates setosus* Koch clearly different from that of Michael (1884). Later, in 1910, he transferred this “*Oribates setosus* sensu Berlese (non-Koch)” to *Trichoribates* Berlese, 1910 (see below: section D).

6) Sellnick (1928: 11) proposed the genus *Fuscozetes*, with the type species *Oribates fuscipes* Koch, 1844, and included *Oribates setosus* Koch, 1839 as a second species, with the following indication: “synon. *setosus* Koch non *setosus* Berlese, Michael [etc.]”. This combination, *Fuscozetes setosus* (C.L. Koch), has remained generally accepted.

### B. The type species and date of publication of *Murcia* C.L. Koch

1) C.L. Koch (1835, CMA 3) first used the genus name *Murcia* while applying it to two species, also newly proposed at that time. These were *Murcia trimaculata* Koch (CMA 3.21) and *Murcia acaroides* Koch (CMA 3.22). He selected no type species.

- 2) Koch (1841, CMA 31) subsequently proposed five more species in the genus *Murcia*: *M. rubra* (CMA 31.20); *M. fumigata* (CMA 31.21); *M. ehippiata* (CMA 31.22); *M. obsoleta* (CMA 31.23); *M. acuminata* (CMA 31.24).
- 3) Koch (1843: 117) designated *M. fumigata* as type species of *Murcia*.
- 4) Michael (1898: 17) formally considered *Murcia trimaculata* Koch to represent the nymph of *Oribates setosus* Koch, making the names synonyms in his view.
- 5) Jacot (1946: 161) applied for a general ruling on the validity of Koch's (1843) designations of type species.
- 6) In 1950 (Bull. Zool. Nomencl. 4: 372–375, Opinion 19), the Commission ruled that (except for monotypic genera) only those species proposed at the time when a genus name was first mentioned are available for subsequent type species designation. Therefore, Koch's designation of *M. fumigata* as the type species of *Murcia* is invalid.
- 7) Sellnick (1928: 10) declared *Murcia trimaculata* Koch as the type species of *Murcia*. This was the first specific indication of type-selection between the two available species (*trimaculata* and *acaroides*), and therefore it must be regarded as having fixed the type species of *Murcia* as *M. trimaculata* Koch.

### C. The validity of the genus *Murcia* C.L. Koch

1) All *Murcia* species of Koch, as named in paragraphs B.1–2 above, are described based only on nymphs (as can easily be seen from his figures), and the generic diagnosis in Koch (1843) includes only general characters of nymphal stages that apply to diverse oribatid families. Attempts have been made to associate only two of these with adults: 1) *M. obsoleta* was suspected by Grandjean (1943) to be the nymph of *Ctenobelba pectinigera* (Berlese, 1908), a member of Eremobelbidae; 2) *M. trimaculata* was suspected, then declared by Michael (1884: 243; 1898: 17) to be the nymph of *Oribata setosa* sensu Michael (non-Koch). As discussed in section A, the illustrated adult of the latter (Michael 1884: pl.7, fig.3) clearly does not belong to *O. setosus* Koch, and probably represents *Trichoribates myrica* (see Gjelstrup & Solhøy 1994). But regarding the nymphs, Jacot (1934: 75) noted that “certainly Koch's figure (fasc. 3/21) and Michael's (pl. 7, fig.4) do not resemble each other”. We agree with Jacot's interpretation; the main reason for lack of resemblance is the presence of large hysterosomal setae on Michael's nymph, which are not indicated in Koch's figure.

2) Sellnick (1928: 10) presented a generic concept for *Murcia*, based exclusively on characters of the adult of the species he included: *Sphaerozetes* (*Trichoribates*) *numerosus* Sellnick, 1924, *Oribata incisella* Kramer, 1897, *Murcia trimaculata* C.L. Koch, 1835, and *M. nova* Sellnick, 1928. He selected *M. trimaculata* as type species (see paragraph B.7). Furthermore, he proposed the following synonymies: “*numerosa* (Selln) = *picipes* Kulcz.; *incisella* (Kramer) = *oxyptera* (Berl)? *trimaculata* C.L. Koch = *setosa* Berlese.”

3) There is no convincing argument that *Murcia trimaculata* Koch is the nymph of the adult *Murcia trimaculata* sensu Sellnick (which is *Trichoribates trimaculatus* auct.; in the sense of authors since Willmann 1931), but there is strong evidence to the contrary. Koch's description and illustration does correspond with nymphs of trichoribatine Ceratozetidae in having dark pigmentation in the region of the opisthonotal gland (e.g. Shaldybina 1977; Behan-Pelletier 1985; Seniczak 1993), but this trait is also found elsewhere, for example in some members of Scheloribatidae. The original description of the nymphal *Murcia trimaculata* is too poor to be related to any particular species, but clearly it is not that of *Trichoribates trimaculatus* auct., which has been well described independently by Shaldybina (1960, 1977) and Seniczak (1980). The latter is unusual among *Trichoribates* species in having conspicuously long hysterosomal setae, which Koch could not have overlooked; Koch's illustration (1835, CMA 3.21) shows a nymph with no noticeable hysterosomal setae and, considering the inferior state of optics at that time, he would have missed the short hysterosomal setae of almost any European trichoribatine ceratozetid species *except* *T. trimaculatus* auct. and *Oribates setosus* sensu Michael. Therefore, Sellnick clearly misidentified *Murcia trimaculata* Koch as *Trichoribates trimaculatus* auct., and the former remains a species inquirenda for which – lacking type material – there is no hope to redescribe with certainty.

4) Why did Sellnick (1928) connect his adult “*Murcia trimaculata* sensu Sellnick (non-Koch)” with Koch's nymph, the true *Murcia trimaculata* Koch? We could speculate that he recognized adults of *Oribates setosus* sensu Berlese (non-Koch) (in Berlese 1887) as corresponding to his *Murcia trimaculata* sensu Sellnick (non-Koch); however, Berlese (1887) made no reference to *M. trimaculata*. Sellnick might have read the assumption of Michael (1884; 1898) that the nymph *M. trimaculata* Koch is conspecific with *Oribata setosa* sensu Michael (non-Koch). But Michael's interpretation of *Oribates setosus* Koch and that of Berlese are misidentifications, as discussed above (section A).

5) Willmann (1931: 168) developed a generic concept for *Trichoribates* Berlese, 1910, which is similar to that of Sellnick (1928) for *Murcia* and which included all the same species. Willmann erroneously declared the selection by Sellnick (1928) of *M. trimaculata* as type species of *Murcia* to be invalid; in fact, Sellnick's action was correct following article 67.2 of the ICZN rules (see above: paragraphs B.6–7). Willmann substituted *Trichoribates* Berlese for *Murcia* sensu Sellnick and selected *M. trimaculata* as type species for *Trichoribates*. By assuming the synonymy of *Sphaerozetes* (*Trichoribates*) *setosus* sensu Berlese (non-Koch) with *Murcia trimaculata* Koch, Willmann made the same error as reported above (paragraph C.4) for Sellnick's nomenclatural action.

6) Subías (2004: 177) reactivated *Murcia* as a senior synonym of *Trichoribates*, listing all the species that show diagnostic characters of *Trichoribates* Berlese. Subías declared *Sphaerozetes* (*Trichoribates*) *berlesei* Jacot, 1929 (proposed as a nomen novum for *Oribates setosus* Koch, sensu Berlese 1887: see section D) to be a junior synonym of *M. trimaculata* Koch. Subías followed the generic concept of *Murcia* as erroneously interpreted by Sellnick (1928) who

considered the adult characters of *Trichoribates trimaculatus* auct. (non-Koch) instead of the nymphal characters of *Murcia trimaculata* Koch.

7) Since Sellnick (1928) and Subías (2004) based their concept of *Murcia* on a misidentification of its type species, *M. trimaculata* Koch (which was proposed as an unidentifiable nymph), we hereby apply article 70.3. of the ICZN rules (ICZN 2000): we reconfirm *Murcia trimaculata* Koch and we reject *Murcia trimaculata* sensu Sellnick (non-Koch) as the type species of *Murcia* Koch.

#### D. The type species of *Trichoribates* Berlese

1) Berlese (1910: 385–386) first used *Trichoribates* as a subgenus of *Sphaerozetes*. No type species was designated. Four species-group taxa were proposed at that time: *S. (T.) lenicomus* Berlese (p. 385); *S. (T.) setosus* Koch var. *austroamericanus* Berlese (p. 386); *S. (T.) oxypterus* Berlese (p. 386); *S. (T.) oxypterus* var. *meridionalis* Berlese (p. 386).

2) Jacot (1929: 422) noted the absence of a type designation and selected *S. (T.) setosus* sensu Berlese [i.e. *Oribates setosus* Koch, sensu Berlese 1887, fasc. 43.4] as type species. He noted that Berlese misidentified Koch's *Oribates setosus* (recombined to *Sphaerozetes* Berlese 1885) and proposed the new name *S. berlesei* for *Oribates setosus* sensu Berlese (non-Koch).

3) Willmann (1931: 169), apparently unaware of Jacot's action, also selected *S. (T.) setosus* sensu Berlese as the type species of *Trichoribates*. Like Jacot, he recognized Berlese's misidentification of *Oribates setosus* Koch, but he considered *Murcia trimaculata* Koch, 1835 to be the nymph of *Oribates setosus* sensu Berlese (non-Koch) [note: contrast with Michael 1898, cf. section B.4 above]. He thus considered *Murcia trimaculata* Koch to be the type species of *Trichoribates*. As this type designation involved a misidentification, it is invalid: the nominal species *M. trimaculata* Koch is not the one considered by Willmann, which in fact was *M. trimaculata* sensu Sellnick 1928 (non-Koch).

4) Jacot (1934: 75) rejected Willmann's subjective synonymy of *Murcia trimaculata* Koch with *Oribates setosus* sensu Berlese (non-Koch), and restated his designation of *Sphaerozetes berlesei* Jacot, 1929 (= *Oribates setosus* sensu Berlese) as type species of *Trichoribates*.

5) Most subsequent monographic works have followed Willmann and cited *Murcia trimaculata* Koch as the oldest available name for the type species of *Trichoribates*. Among others, these include: Radford (1950: 200; he erroneously indicated that *Trichoribates* was monotypic); Sellnick (1960: 60); Balogh (1972: 172); Shaldybina (1975: 292); and Weigmann (2006: 388).

6) Several authors considered *T. berlesei* (i.e., *S. (T.) setosus* sensu Berlese) to be conspecific with *T. trimaculatus* sensu Willmann (non-Koch): These include Pérez-Iñigo (1972: 288); Marshall et al. (1987: 299); Mahunka & Mahunka-Papp (2004: 273); and Weigmann (2006: 388). This opinion is generally accepted.

7) Pérez-Iñigo (1993: 178, 299) considered the type species of *Trichoribates* to be *Sphaerozetes (Trichoribates) setosus* sensu Berlese, 1889 [note: this is incorrect: it is Berlese 1887 (AMS 43.4)] = *Trichoribates berlesei* Jacot, 1929. Following the argumentation of Jacot (1929), he declared *T. trimaculatus* sensu Willmann as invalid and conspecific with *T. berlesei*.

#### Summary

*Oribates setosus* Koch, 1839, is a member of the genus *Fuscozetes* Sellnick, 1928, as currently recognized in modern monographs.

The type species of *Murcia* Koch, 1835 was fixed by Sellnick (1928) as *M. trimaculata* Koch, 1835. Since no type specimen is available and the original description is based only on an unrecognizable nymph that is clearly not the species considered by Sellnick, we consider it a *species inquirenda*. Since Sellnick's action involved a misidentification of the type species, we herewith invoke the provisions of article 70.3 of the ICZN rules. We reconfirm *Murcia trimaculata* Koch in its original sense as type species of *Murcia* and reject the application of *Murcia trimaculata* sensu Sellnick (non-Koch), which is validly named *Trichoribates berlesei* Jacot, 1929.

The genus *Murcia* Koch, 1835, is unrecognizable because the type species, *M. trimaculata* Koch is unrecognizable. The synonymy of this long-abandoned name with the well-known and widely used name *Trichoribates* Berlese, 1910 is therefore rejected, and species recently attributed to *Murcia* (e.g. by Subías 2004) should revert back to *Trichoribates*.

#### References

- Balogh, J. (1972) *The oribatid genera of the world*. Akad. Kiadó, Budapest: 188 pp. + 71 tab.  
Behan-Pelletier V.M. (1985) Ceratozetidae of the Western North American Arctic. *Canadian Entomologist*, 117, 1287–1366.  
Berlese, A. (1887) *Acari, Myriapoda et Scorpiones hucusque in Italia reperta*. Portici, Padova. Fasc. 43.4.  
Berlese A. (1908) Elenco di generi e specie nuovi di Acari. *Redia*, 5, 1–15.  
Berlese, A. (1910) Brevi diagnosi di generi e specie nuovi di Acari. *Redia*, 6, 346–388.  
Dugès A.L. (1834) Recherches sur l'ordre des Acariens I–III. *Annales des Sciences Naturelles, Zoologie*, 2(2), 18–63.  
Gjelstrup, P. & Solhøy, T. (1994): *The Oribatid mites (Acari) of Iceland*. In: *The Zoology of Iceland*. 3 Part 57e.



- Steenstrupia*, Zoological Museum, Copenhagen, 78 pp.
- Grandjean, F. (1943) Observations sur les Oribates (16e serie). *Bulletin du Museum d'Histoire Naturelle* (2), 15, 410–417.
- ICZN, International Commission on Zoological Nomenclature (2000) *International code of zoological nomenclature*. 4<sup>th</sup> edition. Natural History Museum, London.
- Jacot, A.P. (1929) Genera of pterogasterine Oribatidae (Acarina). *Transactions of the American Microscopical Society*, 48, 416–430.
- Jacot, A.P. (1934) Zur Systematik der Oribatiden (Acarina) nach Willmann (May, 1930). *Entomological News*, 14, 74–77.
- Jacot, A.P. (1946) On the validity of the genotypes designated by Koch (C. L.), 1837–1842, *Übersicht des Arachnidensystems*, for genera, the names of which had been first published by that author in 1835–1842, *Deutschlands Crustaceen, Myriapoden und Arachniden*. *Bulletin of Zoological Nomenclature*, 1, 161.
- Koch, C.L. (1835–1844) *Deutschlands Crustaceen, Myriapoden und Arachniden*. CMA. Hefte 2–3: 1835; Hefte 29–30: 1839; Hefte 31–32: 1841; Hefte 38–39: 1844. Regensburg.
- Koch, C.L. (1843) *Übersicht des Arachnidensystems. Landmilben: Käfermilben (Carabodides)*. Heft 3. Nürnberg, pp. 96–118, Taf. 11 und 12.
- Kramer, P. (1897) Zwei neue Oribatiden von der Insel Borkum. *Zoologischer Anzeiger*, 20, 535–536.
- Latreille P.A. (1802) Crustacés et insectes. *Histoire Naturelle, générale et particulière, nouvelle édition*, Vol. 3, Paris.
- Luxton, M. (1996) Oribatid mites of the British Isles: a check list and notes on biogeography (Acari: Oribatida). *Journal of Natural History*, 30, 803–822.
- Mahunka, S. & Mahunka-Papp, L. (2004) *A catalogue of the hungarian oribatid mites (Acari: Oribatida)*. *Pedozoologica Hungarica*. Vol. 2. Hungarian Natural History Museum, Budapest, 363 pp.
- Marshall, V.G., Reeves, R.M. & Norton, R.A. (1987) Catalogue of the Oribatida (Acari) of continental United States and Canada. *Memoirs Entomological Society of Canada*, 139, 1–418.
- Michael, A.D. (1884) *British Oribatidae*. Vol. 1. Ray Society, London: pp. 1–336 + pl. 1–24.
- Michael, A.D. (1888) *British Oribatidae*. Vol. 2. Ray Society, London: pp. 337–657 + pl. 25–54.
- Michael, A.D. (1898) *Acarina. Oribatidae*. In: *Das Tierreich*. Vol. 3. Friedländer, Berlin. 93 pp.
- Pérez-Iñigo, C. (1972) Acaros Oribatidos de Suelos de España peninsular e Islas Baleares (Acari, Oribatei). Parte IV. *Eos, Revista Española de Entomología*, 47, 247–333.
- Pérez-Iñigo, C. (1993) *Acari: Oribatei, Poronota*. In: Ramos, M.A. (ed.), *Fauna Ibérica*. Vol. 3. Museo Nacional de Ciencias Naturales, Madrid, 320 pp.
- Radford, C.D. (1950) Systematic check list of mite genera and type species. *Union International Sciences, Biological Serie C 1*, 1–232.
- Sellnick, M. (1924) Zur Kenntnis der estländischen Moorfauna. Oribatiden. *Sitzungsberichte der Naturforscher-Gesellschaft zu Dorpat*, 31, 65–71.
- Sellnick, M. (1928) *Formenkreis: Hornmilben*. In: Brohmer, P., Ehrmann, P. & Ulmer, G. (eds), *Tierwelt Mitteleuropas*. Vol. 3,4, Teil 9. Quelle & Meyer, Leipzig, pp. 1–41.
- Sellnick, M. (1960) *Formenkreis: Hornmilben, Oribatei*. In: Brohmer, P., Ehrmann, P. & Ulmer, G. (eds), *Die Tierwelt Mitteleuropas*. Vol. 3,4. (Ergänzung). Quelle & Meyer, Leipzig, pp. 45–134.
- Seniczak, S. (1980) The morphology of the juvenile stages of moss mites of the subfamily Trichoribatinae (Acari, Oribatei). I. *Annales Zoologici*, 35, 83–92.
- Seniczak, S. (1993) The morphology of juvenile stages of moss mites of the subfamily Trichoribatinae (Acari, Oribatida). V. *Zoologischer Anzeiger*, 230, 153–168.
- Shaldybina, E.S. (1960) A contribution to the biology of *Trichoribates trimaculatus* (C.L.Koch), 1836, an oribatid mite of the family Ceratozetidae. *Helminthological Symposium, No. 2, Scientific Notes, Gorkij*, 27, 133–152. (In Russian).
- Shaldybina, E.S. (1975) Superfamily Ceratozetoidea. In: Gilyarov, M. S. & Krivolutsky, D. A. (eds) *A key to the soil-inhabiting mites. Sarcoptiformes*. Nauka, Moscow, pp. 275–319.
- Shaldybina, E.S. (1977) The preimaginal stages of ceratozetoids (Oribatei, Ceratozetidae). *Fauna, sistemática, biologija i ekologiya gelmintov i ikh promezhutochnykh khozyaev, Gorkij*, 76–89. (In Russian).
- Subías, L.S. (2004) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del mundo (1758–2002). *Graellsia*, 60 (num. extra.), 1–305.
- Trägårdh, I. (1902) Beiträge zur Kenntnis der schwedischen Acaridenfauna. I. Lappländische Trombidiiden und Oribatiden. *Bihang till Kongliga Svenska Vetenskaps-akademiens handlingar*, 28, 1–26.
- Weigmann, G. (2006) *Hornmilben (Oribatida)*. In: Dahl, F. (ed.), *Die Tierwelt Deutschlands*. Vol. 76. Goecke & Evers, Keltern, 520 pp.
- Willmann, C. (1931) *Moosmilben oder Oribatiden (Cryptostigmata)*. In: Dahl, F. (ed.), *Die Tierwelt Deutschlands*. Vol. 22, V. Fischer, Jena, pp. 79–200.